

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant:	LANKHORST <i>et al.</i>	Examiner:	Ingham, John C.
Serial No.:	10/530,449	Group Art Unit:	2814
Filed:	April 6, 2005	Docket No.:	NL020983 US
Title:	ELECTRIC DEVICE COMPRISING PHASE CHANGE MATERIAL		

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**REPLY BRIEF**

Mail Stop Appeal Brief-Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Customer No. <b>65913</b>
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Dear Sir:

This is a Reply Brief submitted pursuant to 37 C.F.R. § 41.41 for the above-referenced patent application. In this Reply Brief, Appellant maintains the arguments set forth in the Appeal Brief filed August 20, 2007 and addresses the Examiner's Answer mailed January 3, 2008.

Appellant maintains that the rejection of claims 1-12 should be reversed.

No fee should be required for the filing of this Reply Brief. However, if deemed necessary, authorization is given to charge/credit Deposit Account number 50-0996 (NXPS.235PA) for all fees/overages.

**I. Status of Claims**

Claims 1-12 stand rejected and presented for appeal. A complete listing of the claims under appeal is provided in an Appendix to this Reply Brief.

**II. Grounds of Rejection Under Appeal**

1. Claims 1-4 and 8-11 stand rejected under 35 U.S.C. § 103(a) over Chiang (U.S. Patent No. 6,339,544) in view of Yan (U.S. Pub. No. 2002/0134995).
2. Claims 5-7 stand rejected under 35 U.S.C. § 103(a) over Chiang (U.S. Patent No. 6,339,544) in view of Yan (U.S. Publication No. 2002/0134995) and further in view of Hawker (U.S. Patent No. 6,670,285).
3. Claim 12 stands rejected under 35 U.S.C. § 103(a) over Chiang (U.S. Patent No. 6,339,544) in view of Yan (U.S. Publication No. 2002/0134995) and further in view of Ovshinsky (U.S. Patent No. 6,141,241).

**III. Appellant's Reply Argument**

Appellant Argued in the Appeal Brief:

Regardless as to whether or not the Chiang reference may improve upon certain characteristics of sol-gels and organic polymers, there is no motivation in the references that would lead one of skill in the art to use such materials in the Yan reference.

The Examiner Answered:

Chiang discloses the structure as claimed and discloses a low-k dielectric but does not specify details of the dielectric material as claimed. Yan teaches the use of low-k dielectrics and provides a specific dielectric that can be applied as a thin film, has small pores and uniform pore distribution, is relatively unaffected by the presence of moisture, and has the necessary mechanical strength to be treated by chemical and mechanical polishing (707). This specific dielectric has all of the properties as

claimed and would be obvious to use as a replacement for the low-k dielectric disclosed by Chiang.

Appellant replies that the Examiner merely recites qualities of the material of Yan (*i.e.*, that is can be applied as a thin film, has small pores and uniform pore distribution, is relatively unaffected by the presence of moisture, and has the necessary mechanical strength to be treated by chemical and mechanical polishing). While these properties may exist, neither the Examiner nor the citations to the references provide any reason that these properties would be advantageous to the specific layer being replaced in the Chiang reference. For example, there is nothing in the record that suggests that the Chiang reference suffers from problems due to the presence of moisture or chemical and mechanical polishing. As such, the Examiner's rejection, which asserts a specific combination of the elements of the references, does not provide any reason why a skilled artisan would seek to combine the relied upon elements. Accordingly, the rejections are improper and must be reversed.

Appellant Argued in the Appeal Brief:

(O)ne of skill in the art would not be motivated to use the porous material of the Yan reference, which teaches away from the use of a material with low thermal conductivity, in the Chiang reference, which teaches the desirability of low thermal conductivity.

The Examiner Answered:

Disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. . . Yan's disclosure relating to an undesirable characteristic of a dense organic polymer (703) and a possible shortcoming of sol-gel silica (704) does not teach away from the use of the material used in the combination.

Appellant replies that the Examiner's argument is moot because these non-preferred embodiments are not taught to have the properties relied upon in the rejection. Namely, the low conductivity materials (as discussed in the background) are taught to be inferior to those materials discussed relative to the invention of the Yan reference and relied upon by the Examiner. Specifically, the prior, low-conductivity materials are taught to be

disadvantageous due to a number of factors including low thermal conductivity. *See, e.g.*, Yan at paragraph 003. The inferior factors are taught to be overcome by the small pores and uniform pore distribution. *See, e.g.*, Yan at paragraph 007. Appellant respectfully submits that the Examiner cannot rely upon properties of both a non-preferred embodiment and the preferred embodiment where the properties are mutually exclusive. Accordingly, the rejections cannot stand and must be reversed because the skilled artisan would interpret the Yan reference as teaching away from using the new materials (*i.e.*, those having small pores with uniform distribution) in applications where, contrary to the teaching of Yan, low thermal conductivity is advantageous.

**IV. Conclusion**

In view of the arguments presented above and those arguments presented in the Appeal Brief, Appellants submit that the rejections are improper, the claimed invention is patentable, and that the rejections of claims 1-12 should be reversed. Appellants respectfully request reversal of the rejections as applied to the appealed claims and allowance of the entire application.

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(NXPS.235PA)

**APPENDIX OF CLAIMS INVOLVED IN THE APPEAL**  
(S/N 10/530,449)

1.       An electric device with a body having:
  - a resistor comprising a phase change material which is able to be in a first phase and in a second phase, the resistor having a surface with a first contact area and a second contact area, the resistor having an electrical resistance between the first contact area and the second contact area, the electrical resistance having a first value when the phase change material is in the first phase and a second value when the phase change material is in the second phase,
  - a first conductor electrically connected to the first contact area,
  - a second conductor electrically connected to the second contact area,
  - the first conductor, the second conductor and the resistor being able to conduct a current for heating of the phase change material to enable a transition from the first phase to the second phase, and
  - a layer of a dielectric material for reducing a heat flow to parts of the body free of the resistor during the heating, the dielectric material comprising a porous material with pores having a size between 0.5 and 50 nm.
2.       An electric device as claimed in claim 1, wherein the pores have a size between 1 and 10 nm.
3.       An electric device as claimed in claim 1, wherein the pores are substantially free of water.
4.       An electric device as claimed in claim 1, wherein the pores have hydrophobic surfaces.
5.       An electric device as claimed in claim 4, wherein the porous material comprises an organosilicate and the hydrophobic surfaces have hydrocarbyl groups.

6. An electric device as claimed in claim 5, wherein the porous material is obtainable by

applying a liquid layer of a composition comprising tetra-alkoxysilane, hydrocarbylalkoxysilane, a surfactant and a solvent onto a substrate, wherein the molar ratio between tetra-alkoxysilane and hydrocarbylalkoxysilane is 3:1 at the most, and

heating the liquid layer to remove the surfactant and the solvent and to form the hydrophobic porous layer.

7. An electric device as claimed in claim 6, characterized in that the surfactant is a cationic surfactant, and the surfactant and the totality of alkoxysilanes are present in a molar ratio greater than 0.1:1.

8. An electric device as claimed in claim 1, characterized in that the porous material has a porosity above 20 percent.

9. An electric device as claimed in claim 1, characterized in that the resistor is embedded in the body, the layer being in direct contact with the resistor.

10. An electric device as claimed in claim 9, characterized in that the first contact area is smaller than the second contact area, and the first conductor comprises a part in direct contact with the first contact area, the part being embedded in the layer.

11. An electric device as claimed in claim 1, characterized in that the first conductor, the second conductor, the resistor and the layer constitute a memory element, and the body comprises:

an array of memory cells, each memory cell comprising a respective memory element and a respective selection device, and

a grid of select lines, each memory cell being individually accessible via the respective select lines connected to the respective selection device.

12. An electric device as claimed in claim 11, characterized in that:
- the selection device comprises a metal oxide semiconductor field effect transistor having a source region, a drain region and a gate region, and
  - the grid of select lines comprises N first select lines, M second select lines, N and M being integers, and
  - an output line, the first conductor of each memory element being electrically connected to a first region selected from the source region and the drain region of the corresponding metal oxide semiconductor field effect transistor, the second conductor of each memory element being electrically connected to the output line, a second region of the corresponding metal oxide semiconductor field effect transistor which is selected from the source region and the drain region and which is free from the first region, being electrically connected to one of the N first select lines, the gate region being electrically connected to one of the M second select lines.



## **APPENDIX OF EVIDENCE**

Appellant is unaware of any evidence submitted in this application pursuant to 37 C.F.R. §§ 1.130, 1.131, and 1.132.

**APPENDIX OF RELATED PROCEEDINGS**

Appellant is unaware of any related appeals, interferences or judicial proceedings.